at1121exam_practice EXAMPLE! DO NOT HAND IN FOR CREDIT (v17)

- If you are looking for a practice exam that you can hand in for credit:

Question 1

Simplify the radical expressions.

$$\sqrt{18} \qquad\qquad \sqrt{98} \qquad\qquad \sqrt{63}$$

$$\sqrt{3 \cdot 3 \cdot 2} \qquad\qquad \sqrt{7 \cdot 7 \cdot 2} \qquad\qquad \sqrt{3 \cdot 3 \cdot 7}$$
$$3\sqrt{2} \qquad\qquad 7\sqrt{2} \qquad\qquad 3\sqrt{7}$$

Question 2

Find all solutions to the equation below:

$$\frac{(x + 7)^2 + 6}{2} = 53$$

First, multiply both sides by 2.
$$(x + 7)^2 + 6 = 106$$

Then, subtract 6 from both sides.
$$(x + 7)^2 = 100$$

Undo the squaring. Remember the plus-minus symbol.
$$x + 7 = \pm 10$$

Subtract 7 from both sides.
$$x = -7 \pm 10$$

So the two solutions are $x = 3$ and $x = -17$.

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Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 12x \;=\; 85$$

Take the linear coefficient, 12, halve it and square the result. You should get 36. Add this to both sides of the equation to complete the square.

$$x^2 + 12x + 36 = 85 + 36$$
$$x^2 + 12x + 36 = 121$$

Factor the perfect-square trinomial.

$$(x + 6)^2 = 121$$
$$x + 6 = \pm 11$$
$$x = -6 \pm 11$$
$$x = 5 \qquad \text{or} \qquad x = -17$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y \;=\; 3x^2 + 30x + 81$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 10x) + 81$$

We want a perfect square. Halve 10 and square the result to get 25 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 10x + 25 - 25) + 81$$

Factor the perfect-square trinomial.

$$y = 3((x + 5)^2 - 25) + 81$$

Distribute the 3.

$$y = 3(x + 5)^2 - 75 + 81$$

Combine the constants to get **vertex form**:

$$y = 3(x + 5)^2 + 6$$

The vertex is at point $(-5, 6)$.